

A graphic on the left side of the page shows the silhouettes of five human heads in profile, facing right. The silhouettes are filled with crumpled paper in various colors: blue, orange, yellow, white, and red. They are layered, with some overlapping others.

In the Public Interest:

**NINE POINTS  
TO CONSIDER  
FOR FOSTERING  
GREATER  
INCLUSION IN  
INNOVATION**

AUTM is charged with providing guidance to its Membership and the technology transfer community to address issues that are vital to advancing our profession globally and maximizing the societal benefit of research discoveries around the world. Examples include the **Nine Points to Consider in Licensing University Technology** and the **COVID-19 Licensing Guidelines**. Recognizing that diversity is a key driver of innovation and a critical component of economic prosperity on a global scale, (1) AUTM has developed the *Nine Points to Consider for Fostering Greater Inclusion in Innovation* as a starting point for conversations on engaging the full capacity of our inventive talent pool.

The **Equality of Opportunity Project** analyzed the lives of more than one million US inventors and found that innovation in the US alone would quadruple if women, people of color and people from low-income families invented at the rate of groups that are not held back by barriers and discrimination. (2) Furthermore, countries that deploy strategies to foster greater inclusion of all inventors in the innovation lifecycle will ultimately be best positioned to maximize GDP and ensure economic prosperity for all their citizens. (3) And diverse teams are more likely than homogeneous teams to discover solutions to some of our greatest challenges – climate, food scarcity and diseases.

Equity and inclusion are complex issues that must be addressed on many levels, admittedly many beyond the control of AUTM and its technology/knowledge transfer (K/TT) stakeholders. Addressing change requires unique approaches for different populations and cultures. But AUTM maintains that K/TT professionals can play a pivotal role in driving aspects of this change when they encourage and engage all researchers to participate in their innovation ecosystems.

Some initiatives noted in this report are already underway at multiple institutions. The goal of this work is to help facilitate meaningful solutions to this complex problem. AUTM encourages those working in the innovation ecosystem to discuss this document and consider deliberate actions to help change the paradigm.

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## NINE POINTS

There are many critical initiatives geared at the longer-term challenge of diversity in STEM education, as well as initiatives to assist women and minorities involved in business. There are far fewer initiatives focused on engaging women and other underrepresented groups at academic institutions and federal laboratories who are already STEM-educated. This demographic is primed to innovate, and the technology transfer profession plays a key role in assisting them. What follows is a roadmap to support their success.

### **POINT 1: Acknowledge the lack of diversity and inclusion in all stages of the innovation lifecycle.**

According to the US Patent and Trademark Office (USPTO), only 20% of patents have a woman listed as an inventor, and only 12% of inventors are women. At the current rate of change, parity won't be achieved in the US until 2092. (4) Likewise, according to the World Intellectual Property Organization (WIPO), globally only 31% of patents have a woman listed, and only 16% of inventors are women. At the current rate of change, parity won't be achieved globally until 2061 (28). The AUTM Licensing Survey suggests that at academic research institutions,

the patent-inventor rates for women are much lower: Participating institutions reported that only 4.9% of new patent applications included at least one woman in the **2021 survey**, and only 4.4% did so in **2022**. In addition, Blacks represent only 0.3% of patent holders and Hispanics only 1.4%. (5)

Research done by Osage University Partners (OUP) has quantified the lack of women founders of US university-based startup companies; of more than 6,000 university startups in the OUP database, only 11% had a female founder or co-founder. (6) Less than 10% of all venture capital deals go to women, people of color and LGBTQ+ founders. Crunchbase reported that only 2.3% of venture capital funding in 2020 was invested in women-led startups and less than 1% in startups led by people of color. (7) Some venture capital funds are seeking to fix this gap through targeted investment in underrepresented populations and, in many cases, are seeing returns on that investment that are better than the average portfolio.

- Recognizing that these disparities limit the innovation potential of the individual institutions technology transfer professionals serve, it is important to take action to resolve them within the context of the K/TT profession. To build understanding in pursuit of change, AUTM launched the **Demographic Survey of Technology Transfer Professionals** in 2022 and established baseline metrics for the K/TT community. AUTM has also developed an **Equity, Diversity and Inclusion Toolkit** of guidance and resources for building an inclusive innovation ecosystem.

## **POINT 2:**

**Greater inclusion of women and minorities in all phases of the innovation lifecycle will ensure a greater diversity of products that address the unmet needs of people from all ethnic backgrounds.**

Modern medicine was developed based on male physiology, often resulting in less than desirable outcomes for women with regard to disease prevention, diagnosis and treatment. For years, women were underrepresented in clinical trials. Only recently have scientists and physicians begun to recognize that multiple diseases and conditions affect women differently than men and that the effectiveness of treatments and therapies for women can differ in both subtle and significant ways from those developed for men. (8) Research has shown that when inventors set out to solve a health problem, male inventors are more likely to solve for a male-oriented condition; women-led teams solve for both genders. Currently less than 2% of the global healthcare pipeline is focused on conditions, beyond oncology, that are largely specific to women. (9) Better outcomes in women's health will have cascading benefits for children and families and contribute to a stronger, healthier society.

Similarly, new research is uncovering instances where medical treatments and devices don't work the same in Caucasian patients as they do in people of color. An example is the commonly used pulse oximeter, which measures the amount of oxygen in a patient's blood. That device was recently determined to be inaccurate when measuring oxygen levels in people with dark skin. During the COVID-19 pandemic, this resulted in patients of color not receiving adequate levels of supplemental oxygen for their recovery. (10) The US Department of Commerce reports that 85% of US population growth between 2011 and 2050 will come from nonwhite ethnic groups. Today, one in three people in the US are people of color, and, by 2050, that is expected to climb to one-half. (11) Therefore, addressing the health issues specific to all populations is essential for ensuring a healthy society.

- A large body of research shows that culturally diverse teams are more likely to develop the most innovative new technologies. (12) Other research shows that solving complex problems like grand challenges requires a multitude of perspectives that mirrors the complexity of the problem and the diversity of people affected. (13) Enriching the inventive talent pool with representatives of different genders, races and nationalities is key to maximizing the development of patentable discoveries that address societal needs and contribute to a better world.

### **POINT 3:**

**Gender and other biases are deeply ingrained in our society, and recognition of these biases, as well as strategies for addressing them, is essential to inclusive innovation.**

In a paper published by members of the AUTM Women Inventors' Special Interest Group (WISIG), the role of the technology transfer office was referenced frequently by many of the 168 academic women surveyed as either a key to their success or as a barrier to their participation in innovation and entrepreneurship. (14)

K/TT professionals influence which inventions are patented, licensed and commercialized. Therefore, they play a gatekeeping role in technology commercialization for innovators at their institutions. Like all humans, K/TT professionals subconsciously hold opinions based on upbringing and culture, which is known as implicit or unconscious bias. Many studies have worked to highlight this, including the Implicit Association Test developed at Harvard that shows academics of both sexes subconsciously associate science with masculine traits (15). Other research suggests technology transfer professionals tend to favor invention disclosures from male faculty members over their female counterparts (16). Respondents from the AUTM WISIG survey shared having similar experiences.

- Because of the increased attention being paid to inclusivity worldwide, there are more training resources and programs than ever to help us address cultural bias. Having the tools to identify negative stereotypes and the ability to see how those are manifested in the innovation ecosystem will better enable K/TT professionals to provide ALL faculty with an equal opportunity to engage in innovation, invention and entrepreneurship.

### **POINT 4:**

**Inclusive educational efforts are needed to demystify the process of invention and technology commercialization to ensure greater engagement of all faculty.**

The technology commercialization pathway is viewed as daunting by many would-be innovators, which discourages them from participation. Training is one of the most important things institutions can do to assist faculty and staff in their innovation journey by making the process seem less intimidating.

- Ensuring the training is inclusive and the instructors are from diverse backgrounds will help engage a larger cross-section of participants. It will also enable instructors to better relate to the many unique challenges faced by women and people of color throughout the innovation lifecycle and

offer suggestions for overcoming these challenges. Diverse instructors also serve as role models, demonstrating that innovation is for everyone. The logistics of when and where training programs are held—such as off-campus locations, times that conflict with other responsibilities, and long, intensive programs—can be roadblocks for some female academics. Offering hybrid or virtual options to a diverse pool of innovators has been shown to drive engagement.

- There are many online educational tools in the form of short videos, informative websites, guidebooks and virtual training currently available that breakdown the patenting process and help inventors prepare to apply for their own patents. They also explore the challenges that may be faced by inventors who are women, people of color and indigenous backgrounds, veterans, those who are low-income, people with disabilities and other underrepresented groups—and provides advice for overcoming those challenges.

### **POINT 5:**

#### **Encouraging participation of all faculty in innovation requires different outreach approaches for different audiences.**

For inclusive innovation to occur, it must be purposefully embedded in the technology transfer community. This requires recognizing that cultural differences necessitate a broader approach to reach a more inclusive audience of potential innovators.

- For improved engagement, international organizations aiming to develop regional and local programs should work to adapt their approaches to the needs of local inventors, taking into consideration their specific challenges and values, such as developing their local communities and valuing their historical knowledge or their environment/natural ecosystems. Less emphasis should be placed on the business of invention, which in some cases can't be a major driver.
- In the WISIG survey of 168 academic women, the most frequently cited reason for participating in innovation activities is to see their research applied to solving real world problems. (13) Training that helps women understand the connection between their participation and the potential societal impact of their discovery can promote ongoing engagement.
- As women are particularly motivated to explore additional resources for research and development funding, communicating these values rather than focusing on patenting and entrepreneurship will motivate more women to engage. Additionally, survey respondents cited encouragement from technology transfer staff or other faculty members as reasons for their engagement.
- Leveraging social networks and partnering with other organizations focused on the advancement of underserved populations, have also been effective for engaging diverse groups of researchers. Using a partner organization's established communication channels and educating its members on how involvement in innovation can help them throughout their careers can be seen as a service that supports the organization's mission.

## POINT 6:

**Efforts are needed to ensure all inventors are given the same level of service before, during and after the invention process.**

The 2019 USPTO Progress and Potential findings reported the women inventor rate (WIR)—the share of women among all US inventor-patentees—grew from 12.1% in 2016 to 12.8% by 2019 (18).

Researchers have offered potential explanations for the lack of diversity in academic patenting and licensing that, are outside the control of technology licensing professionals. But because technology transfer staff influence which inventions are patented and licensed, they do play a significant role in determining who participates in technology commercialization.

The WISIG survey of 168 academic women involved in technology commercialization found that half felt their technology transfer office was immensely helpful, while half felt it was a deterrent to their involvement. Women who felt they were not treated equally reported discrimination primarily from the technology transfer staff and patent attorneys. These findings are consistent with the IWPR report on Tackling the Gender and Racial Patenting Gap to Drive Innovation. (19)

In the US, Blacks participate at each stage of the innovation process at lower rates than their white counterparts. In the United Kingdom, Black, Asian and minority ethnic men are 28% less likely to work in STEM than white men, with the latter demographic still dominating academic science. (20) These metrics are similar in many countries around the world.

- Establishing and documenting clearly defined criteria for patenting can assist staff in making objective and informed decisions. Tracking metrics on the race and gender of people submitting invention disclosures, and which of those disclosures are patented, enables offices to review their patenting decisions to ensure they are being objective.
- Reporting this data in **AUTM's Annual Licensing Activity Survey** provides important information for policy makers who can support efforts for more inclusive innovation such as the **US SUCCESS Act**.
- The USPTO recognizes that documenting the demographic makeup of inventors who apply for patents is a critical first step toward more equitable participation in the intellectual property ecosystem. As such, they are working to establish methods for studying the diversity of patent applicants, including those applicants who are minorities, women or veterans, and to identify policies that will expand participation. Technology transfer offices can assist with this effort by also collecting and tracking these metrics.

## POINT 7:

**All faculty interested in starting a company should be given equal consideration and support.**

Establishing and documenting criteria for invention disclosures that are most appropriate as the foundation for starting a company can assist staff in making objective and informed decisions. The fact that women don't typically self-associate as entrepreneurs means they may not express an interest in starting a company, but with proper coaching and mentoring from a technology transfer professional, they could be well-positioned to do so. All inventors should have access to the training and resources they need to make informed decisions and achieve their goals.

Technology transfer offices that manage or work in conjunction with local incubators or accelerators can help develop policies and procedures to ensure inclusive engagement of diverse entrepreneurs.

- Several factors, including recruitment and selection biases, prevent diverse entrepreneurs from gaining access to incubators, according to a **report published by iNBIA**, a nonprofit organization that provides education, global collaboration, mentorship and best practices in business incubation, in conjunction with JP Morgan. Often incubator staff and mentors are devoid of women and minorities, making it less inviting for startup founders from those populations. Since incubators often assist spinoffs in accessing capital, lack of participation in incubation programs may contribute to the lack of venture funding invested in women and minority founded companies.

### **POINT 8:**

#### **Consider programs that address the unmet needs and unique challenges faced by women and minorities in the technology commercialization process.**

The need for training on the inventive process in minority populations is well recognized, but it is often prescribed based on the white male experience. For example, research has found that venture capitalists prefer pitches by men, even when the same content is delivered by women [21]. Similarly, investors have been found to ask male and female innovators different types of questions (known as “Promotion vs Prevention” questions). This is true for other minority groups as well. People with disabilities, for example, will be asked if they have the capability to handle a company, and people of color will be asked if they really have the drive to stick with it or how they can compete with established companies. Conversely, white, male founders are more likely to be asked about their visions for the future and to be given a chance to promote their ideas (with the implied expectation that they can handle any issues that arise).

- While training on investor presentation techniques is common in entrepreneurial programs, providing additional training about common biases held by many venture capitalists and techniques for overcoming those biases will increase their odds of obtaining funding. Similarly, other related training topics can be established to recognize the unique challenges encountered by diverse innovators and provide techniques for addressing them.

The Institute for Women’s Policy Research published a report that profiles programs designed to increase gender diversity in patenting, innovation and entrepreneurship in a variety of settings, including academic institutions. It describes seven programs in depth and highlights how they were developed, their successes and lessons learned, and their results in promoting gender diversity. The report provides an accessible resource to help increase the diversity of innovators who patent and commercialize their inventions. (22)

- Half of the doctorates in the US are earned by women, (23) and academic institutions are the largest employers of women with doctorates in science, engineering and health. (24) Focusing efforts to engage these STEM-educated women who have an above average ability to contribute to the innovation ecosystem has significant potential to ensuring greater engagement of the entire inventive talent pool.

- More should be done to address the “innovation paradox” wherein demographically underrepresented students innovate at higher rates than majority students, but their novel contributions are discounted. This not only limits their participation in innovation, it makes them less likely to earn influential positions in academia—thus partly explaining their underrepresentation in academic innovation. (25)

## **POINT 9:**

### **Women and minorities need greater access to mentorship, networks and role models.**

One of the most often cited barriers to entry for women and minorities in the innovation lifecycle is their lack of access to mentors and role models, particularly those with whom they can relate. Because women tend to have a larger share of household and family responsibilities than men, they tend to have less time for networking and, in turn, less exposure and access to mentors. This is further exacerbated by the fact that women are underrepresented in innovation and entrepreneurship.

- Electronic communications make it easy for technology transfer offices to provide some level of mentoring to all inventors (not just the lead inventor). Copying all inventors on communications related to their invention disclosure and patenting creates good will, enables all inventors to share additional data and helps educate all involved on the process. It can establish realistic expectations and keep all inventors positively engaged with the technology transfer office, so they are inclined to submit future disclosures. It also helps to ensure all inventors are included on the intellectual property documentation, reducing the likelihood of future litigation or patent invalidation.
- Role models also have a positive effect on success. Whenever possible, introduce underrepresented new inventors to successful innovators to increase their level of engagement in innovation.
- Ensuring technology commercialization workshops and seminars have speakers and panelists who are representative of diverse populations will also help foster greater inclusion.

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